

# **ENVS\*6460 - Environmental Remediation**

**Winter 2026 Course Outline**

**Section: 01**

**Credits: 0.50**

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## **Calendar Description**

This course discusses environmental remediation/bioremediation topics including, but not limited to, phytoremediation, bioremediation, mycoremediation, and physical and chemical remediation to improve air, water and soil quality. For example, this course may explore the use of plants to take up and accumulate toxins from contaminated soils, use of bacteria to degrade groundwater contaminants, and physical/chemical processes to remove contaminated substrates or break down contaminants in those substrates. Environmental remediation is, by nature, multidisciplinary, involving chemistry, physics, biology, engineering, landscape design, etc. Numerous guest lectures from academic and commercial experts serve to explore this diverse field.

**Department(s):** School of Environmental Sciences

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## **Course Description**

This course will be largely discussion based and will cover a wide range of topics falling under the 'Environmental Remediation' umbrella (e.g., phytoremediation; bioremediation; chemical remediation; physical remediation, etc.). Numerous guest speakers will provide commercial and policy/regulatory perspectives. There will be a more or less even focus on biologically-based remediation tools and physical/chemical processes, and where appropriate their integration will be considered. This graduate level course is designed to provide a baseline understanding and appreciation of key topic areas that will be the basis for student lead learning/teaching. It is envisioned that the course will provide students with an opportunity to explore topics of interest, either within the context of their thesis work or as an opportunity to explore topics outside of their thesis. Students will work in small groups to thoroughly explore their selected topic and present that topic to the class in an understandable and accessible fashion.

## **Lecture Schedule**

TuTh 10am-11:20am in ALEX\*028 (1/5 to 4/21)

Delivery is in-person. Lecture material will be annotated/partially recorded and posted but attendance is expected. Most lectures will have a discussion component that is best served with immediate in-person interaction. If predominantly in-person delivery is not an option, discuss your situation with the instructor and/or consider other course offerings.

## **Instructor Information**

**Dr. Thomas Graham, PhD**

Associate Professor; Kensana Research Chair in CES

Email: [tgraham@uoguelph.ca](mailto:tgraham@uoguelph.ca)

Office: Bovey 2105

Office Hours:

By appointment or luck (drop-in)

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## **Learning Resources**

There is no one textbook for this course. Readings (text chapters, journal articles, popular press, etc.) and other learning resources (videos, etc.) will be assigned and provided on the Course Link site.

## **Cost of Textbooks and Learning Resources**

*There are no specific textbooks. All required material will be provided without cost or as open access information.*

Textbook / Learning Resource	Required / Recommended	Cost
Misc.	both	\$0

Students are advised that prices are often determined by the publisher or bookstore and may be subject to change.

## Course Level Learning Outcomes

By the end of this course, you should be able to, or have:

1. Develop a baseline understanding of, and appreciation for, the various challenges and potential benefits of Environmental Remediation
2. Identify an area of interest, within the context of Environmental Remediation, to study and explore by attending lectures, group discussions, critiques of current scientific journal articles, professional interviews and group work.
3. Demonstrate enhanced critical thinking skills through critiquing current scientific journal articles (both high- and low-quality articles) and critiquing other students' presentations.
4. Demonstrate enhanced communication skills (both oral and written) through written assignments, and an in-class presentation (on a student-selected topic).
5. Exhibit improved professional and ethical behavior towards diverse scientific ideas and academic opinions through presentations, group discussions and critiquing presentations by fellow students.
6. Develop a better understanding of career options and requirements of the field by conducting an interview with an Environmental Remediation professional (commercial, academic, government)

## Instructor Statement

The field of Environmental Remediation (ER; it also goes by other names) is very broad and cannot be covered in one course; it should be its own degree in fact. Keeping this in mind, I view my role more as a facilitator than an instructor/lecturer. I have expertise in some areas of ER, and certainly more broadly in the life and physical sciences, but I am by no means an expert in all things ER. We will rely on actual industry experts to provide details and teachings around the inner workings of various ER areas. Meanwhile, I will be working hard to expose you to new ideas and perhaps challenge some of your current views about the world and our place in it. I will also be pushing you hard to develop your critical thinking skills; they are so desperately needed these days. Your role this semester will be to both listen and to engage with your peers and the material covered. You are tasked, as graduate students, with developing your own knowledge and helping to convey that knowledge to your peers, as they do the same for you.

This course has historically been described as both hopeful and cautionary, both in retrospect and as we look forward. Both are critical if we are to address our mess.

## Assessment Breakdown

Description	Weighting (%)	Due Date
Perspectives & Preconceptions - Start of semester	5%	Friday January 9 <sup>th</sup> by 23:59
Perspectives & Evolution of Understanding - End of semester reflections	5%	Sunday April 5 <sup>th</sup> by 23:59
Group Topic Approval	2.5%	Three weeks before your assigned presentation date
Group Presentation Detailed Outline & Annotated Bibliography	10%	Two weeks before your assigned presentation date**
Group Presentation	25%	February 24 <sup>th</sup> - April 2 <sup>nd</sup> - start date depends on final #s
Group Feedback	5%	Within 48hrs of the presentation
Completion of assigned readings & viewings	10%	As assigned throughout the semester
Mid-Term Quiz	10%	Opens Thursday February 26 <sup>th</sup> @ 12:00 Closes Friday February 27 <sup>th</sup> @ 12:00
News article summary/critique	5%	Monday March 16 <sup>th</sup> @ 23:59
Informational Interview	10%	Monday March 23 <sup>rd</sup> @ 23:59

Review of Informational Interviews	2.5%	Friday March 27 <sup>th</sup> @ 23:59
Critical Review - Journal Article	10%	Friday April 3 <sup>rd</sup> @ 23:59
** Those groups that are randomly assigned the first four slots will be given extra consideration for later submissions		

## Last Day to Drop Course

The final day to drop Winter 2026 courses without academic penalty is the last day of classes: April 06

After this date, a mark will be recorded, whether course work is completed or not (a zero is assigned for missed tests/assignments). This mark will show on the student's transcript and will be calculated into their average.

## Course Grading Policies

### Submission of Assignments

*Most assignments will be submitted to the appropriate Courselink Dropbox. Peer evaluations will be submitted as completed surveys.*

### Late Assignment

*It is strongly recommended that the student speak to the professor in advance if an assignment will be late. If this is not possible, the onus is on the student to arrange to discuss the circumstances with the professor and to come up with a suitable penalty for a missed deadline. A minimum penalty will be applied in all cases\* in order to be equitable to those that submitted on time.*

*\* illness will be considered as per university policy*

## Course Standard Statements

### Course Policies

*ENVS\*6460 is a graduate level class and the expectation is that students conduct themselves in a professional manner commensurate with their career stage. The university has laid out the hallmarks and learning outcomes for graduate level training. The content delivery and assessment methods are designed to advance the learning outcomes and obligations outlined by the university. See below.*

#### Critical and Creative Thinking

*Independent Inquiry and Analysis # Problem Solving # Creativity # Depth and Breadth of Understanding*

Critical and creative thinking is a concept in which one applies logical principles, after much inquiry and analysis, to solve problems with a high degree of innovation, divergent thinking and risk taking. Those mastering this outcome shows evidence of integrating knowledge and applying this knowledge across disciplinary boundaries. Depth and breadth of understanding of disciplines is essential to this outcome. At the graduate level, originality in the application of knowledge (master's) and undertaking of research (doctoral) is expected.

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#### Literacy

*Information Literacy # Quantitative Literacy # Technological Literacy # Visual Literacy*

Literacy is the ability to extract material from a variety of resources, assess the quality and validity of the material, and use it to discover new knowledge. The comfort in using quantitative literacy also exists in this definition, as does using technology effectively and developing visual literacy.

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#### Global Understanding

*Global Understanding # Sense of Historical Development # Civic Knowledge and Engagement Intercultural Knowledge and Competence*

Global understanding encompasses the knowledge of cultural similarities and differences, the context (historical, geographical, political and environmental) from which these arise, and how they are manifest in modern society. Global understanding is exercised as civic engagement, intercultural competence and the ability to understand an academic discipline outside of the domestic context.

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#### Communicating

**Oral Communication # Written Communication # Reading Comprehension # Integrative Communication**

Communicating is the ability to interact effectively with a variety of individuals and groups, and convey information successfully in a variety of formats including oral and written communication. Communicating also comprises attentiveness and listening, as well as reading comprehension. It is the ability to communicate and synthesize information, arguments, and analyses accurately and reliably.

**Professional and Ethical Behaviour****Teamwork # Ethical Reasoning # Leadership # Personal Organization & Time Management # Intellectual Independence**

Professional and ethical behaviour requires the ability to accomplish the tasks at hand with proficient skills in teamwork and leadership, while remembering ethical reasoning behind all decisions. The ability for organizational and time management skills is essential in bringing together all aspects of managing self and others. Academic integrity is central to mastery in this outcome. At the graduate level, intellectual independence is needed for professional and academic development and engagement.

## **Standard Statements for Graduate Courses**

### **Academic Integrity**

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

The Academic Misconduct Policy (<https://calendar.uoguelph.ca/graduate-calendar/general-regulations/academic-misconduct/>) is outlined in the Graduate Calendar.

### **Accessibility**

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway.

Use of the SAS Exam Centre requires students to make a booking at least 10 business days in advance, and no later than the first business day in November, March or July as appropriate for the semester. Similarly, new or changed accommodations for online quizzes, tests and exams must be approved at least a week ahead of time. For students at the Guelph campus, information can be found on the SAS website. (<https://www.uoguelph.ca/sas/>)

### **Accommodation of Religious Obligations**

If you are unable to meet an in-course requirement due to religious obligations, please email the course instructor within two weeks of the start of the semester to make alternate arrangements.

See the Academic calendar for information on regulations and procedures for Academic Accommodation of Religious Obligations (<https://calendar.uoguelph.ca/graduate-calendar/general-regulations/academic-accommodation-religious-obligations/>)

### **Copies of Out-of-class Assignments**

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

### **Drop Date**

Courses that are one semester long must be dropped by the end of the last day of classes; two-semester courses must be dropped by the last day of classes in the second semester. The regulations and procedures for Dropping Courses (<https://calendar.uoguelph.ca/graduate-calendar/general-regulations/registration/>) dropping courses are available in the Graduate Calendar (<https://calendar.uoguelph.ca/graduate-calendar/general-regulations/registration/>).

## **Email Communication**

As per university regulations, all students are required to check their <uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its students.

## **Health and Wellbeing**

The University of Guelph provides a wide range of health and wellbeing services at the Vaccarino Centre for Student Wellness (<https://wellness.uoguelph.ca/>). If you are concerned about your mental health and not sure where to start, connect with a Student Wellness Navigator (<https://wellness.uoguelph.ca/navigators/>) who can help develop a plan to manage and support your mental health or check out our mental wellbeing resources. (<https://wellness.uoguelph.ca/shine-this-year/>) The Student Wellness team are here to help and welcome the opportunity to connect with you.

## **Illness**

Medical notes will not normally be required for singular instances of academic consideration, although students may be required to provide supporting documentation for multiple missed assessments or when involving a large part of a course (e.g., final exam or major assignment).

## **Recording of Materials**

Presentations that are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, a student, or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

## **Resources**

The Academic Calendars (<http://www.uoguelph.ca/registrar/calendars/?index>) are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs.

## **When You Cannot Meet a Course Requirement**

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. See the Graduate Calendar for information on regulations and procedures for Academic Consideration (<https://calendar.uoguelph.ca/graduate-calendar/general-regulations/grounds-academic-consideration/>).